DOCUMENT RESUME

ED 165 540 HE 010 767

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TITLE A Role for Homemade Financial Models in Faculty Staffing and Resource Allocations.
INSTITUTION Georgetown Univ., Washington, D.C.
PUB DATE 27 Oct 78
NOTE 8p.; Paper presented to the Southern Association for Institutional Research (Nashville, Tennessee, October 26-27, 1978)

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS College Faculty; Cost Effectiveness; Departments; *Educational Finance; Expenditures; Financial Policy; Higher Education; Institutional Research; *Instructional Student Costs; *Models; Private Colleges; Program Budgeting; *Program Costs; Research Projects; *Resource Allocations; *Staff Utilization
IDENTIFIERS *Georgetown University DC

ABSTRACT

Recent efforts at Georgetown University to formulate financial models to assist in staffing and allocation decisions are described. The analysis considers a departmental model that has been developed, a program model that is being designed, and the potential uses and misuses of the models. Both models use historical data and do not attempt to project future circumstances. The departmental model is a historical cost and enrollment model. Essentially the model distributes both the direct and indirect income and expenses of the main campus to 31 instructional units (usually academic departments) using formulas that include designated income, credit hour enrollment, assigned square footage, and actual expenditures. Once income and expenses are distributed to the units, a balance of payments is calculated to estimate the contribution or drain of each unit. The departmental model also made possible a program model by first estimating income and expenses for the academic departments. Once these figures are known, the next step is to break them down by courses offered, and then to the students enrolled according to the programs they are pursuing. A total of each program's costs can then be made from all of the instructional units (departments) contributing to the program in order to arrive at an overall cost for each program or major. Noncost factors involved in faculty staffing and allocation decisions are also summarized. (SW)

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A ROLE FOR HOMEMADE FINANCIAL MODELS IN FACULTY STAFFING AND RESOURCE ALLOCATIONS

Presented to the
Souther Association for Institutional Research
Nashville, Tennessee
October 26-27, 1978

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A Role for Homemade Financial Models in Faculty Staffing and Resource Allocations

by Joseph Pettit[1]
August 31, 1978

Introduction

In an era of increasingly scarce financial resources and constant upward pressure on expenses, the question of faculty staffing and resource allocation becomes especially important in colleges and universities. It becomes even more critical when an institution's enrollment either remains steady or declines. This paper describes recent efforts on the main campus of Georgetown University to formulate financial models to assist in staffing and allocation decisions. The paper not only describes a departmental model which has been developed and a program model which is in the design stage, but also the uses and misuses that can be made of these models. Both models use historical data and do not attempt to project future circumstances. Finally, the study concludes with a review of other factors (both quantitative and qualitative) that experience throughout the country has shown play an even greater role in staffing and allocation decisions.

For readers outside the University, it will be helpful to know something about the institution. Georgetown University is a 189 year old, private, Catholic, Jesuit university in Washington, D.C., composed of ten schools. The University is organized into three campuses: the Medical Center, the Law Center, and the Main Campus. The University is classified among "other research universities" by the Academy for Educational Development.[2] According to the American Association of University Professors' (AAUP) study of faculty compensation, the University is classified in category 1 as follows:[3]

Rank	Average Compensation	AAUP Percentile
Full Professor	34,300	80th
Associate Professor	25,300	80th
Assistant Professor	19,300	60th
Instructor	16,000	60th

This paper will concern models designed for the main campus which is made up of six schools. In the 1977-78 academic year, enrollment of degree students on the main campus was 4874 undergraduates[4] (98% full-time) and 1407 graduate students (38% full-time). Barron's Profile of American Colleges places Georgetown in the highest category of selectivity for undergraduate admissions, "most competitive." This category contained only twenty other institutions.[5]

Context and Process

By themselves, financial models are only so many assumptions and numbers on a piece of paper. It is in the context and process of their development and utilization that they gain acceptance and are used or misused. Several years ago at Georgetown, an extensive program cost model was produced. Unfortunately the isolated manner of its development together with a lack of confidence in existing enrollment and cost data, combined to severely restrict its acceptance and usefulness.

Over the past three years a Main Campus Finance Committee, composed of eighteen members, including faculty, students and administrators, has gained a very significant voice in the analysis and formulation of the main campus budget. A year and a half ago, a Subcommittee on Faculty Staffing and Resource Allocation was formed and its twelve members also include faculty, students and administrators. Both the Committee and its Subcommittee are provided technical support by the Main Campus Finance Officer and the Director of Institutional Research. Close liaison has been established between the parent Committee, the academic deans, the Executive Vice President for Academic Affairs, and the Allocation Subcommittee.

Last year, once the Subcommittee approved the initial design of the departmental model, it was circulated to departmental chairmen by the Executive Vice President with a request for comments and suggestions. A general briefing session for the chairmen was followed by individual discussions when requested. The written comments and suggestions by the deans and chairmen were reviewed by the Subcommittee, along with individual comments by members. A final version was then approved by the Subcommittee and submitted to the parent Committee for its review. The Committee recommended to the Executive Vice President that the model be computerized and become one factor in decisions affecting faculty staffing and resource allocation.

It is the firm conviction of the author that such widespread consultation and participation are critical in the formulation of meaningful models. Continued consultation and participation are also needed in the on-going use of the model.

Related to the questions of context and process is whether an institution should try to develop a homemade financial model or to implement a packaged model available from a number of vendors. At the current time a fairly definitive answer has been given this question in a study sponsored by the American Council on Education. Based on site visits to twenty-one colleges and universities and a mail survey which was returned by almost three hundred institutions, the authors summarize their answer to this question in three quotations:[6]

- Homemade systems encountered less difficulty in development and provided greater perceived benefits for internal decisions than vendor-supplied systems.

- Homemade systems should be considered for internal decision-making, particularly if information needs have not been carefully identified.

- The heterogeneous nature of higher education is evident. Differences in the extent of machine readability and integration of data files and the appropriateness of using SCH as a measure of institutional activity are important in the handling of each type of institution. The relative success of homemade systems can be attributed to their ability to overcome the problems of heterogeneity.

Now that the critical role of context and process have been stressed, together with support for homemade systems, we can turn to the models adopted and under consideration at Georgetown.

Departmental Model

The departmental model is a historical cost and enrollment model. Essentially the model distributes both the direct and indirect income and expenses of the main campus to thirty-one instructional units (in most cases these are academic departments) using formulas which include designated income, credit hour enrollment, assigned square footage, and actual expenditures. Once income and expenses are distributed to the units, a balance of payments is calculated to estimate the contribution or drain of each unit. A more detailed description of the model can be seen by the following breakdown of the income, cost and enrollment data which is used, along with the formulae by which they are distributed.

The first model building step is to reformulate the main campus budget so as to isolate the basic instructional operations. Six important changes are made. Tuition and fees are broken down by Schools. The designated portions of endowment income and gifts are distributed to individual schools. Only the net expenses of the International Programs Office are included, so as to exclude tuition and fees for academic year programs abroad. Likewise, only the net income of the School for Summer and Continuing Education (SSCE) is included. Similarly, only overhead recovery is included for Sponsored Programs. This reduced the regular FY78 operating budget from 28.1 million dollars to 21.6 million dollars. Finally, the expenses of graduate fellowships are divided between those that require instructionally related duties of the recipients and those that do not have such a requirement. The former are then included as direct expenses of the respective units, whereas the latter are assigned to the units as overhead expenses.

Our regular enrollment data likewise requires some adjustments. The basic enrollment statistic used in the model is student credit hours (SCH) enrolled. At the graduate level, thesis research is registered without credit, but for the purposes of this study each such registration is assigned three credits per semester. Credit hour enrollments for each instructional unit (departments) were then broken down by individual schools. Likewise two sets of enrollment data are required. One places the enrollment for faculty members holding dual appointments in the department which pays their salary. The other moves both their salaries and enrollments to their second home.

The most difficult aspect in the models' development concerned the various formulae used to distribute income and expenses to the units. It was not surprising that the greatest controversy arose over those which distributed indirect expenses. In making these decisions, the Subcommittee preferred, where possible, to distribute actual income and expenses. This is possible for the direct expenses of the instructional units, computer charges, and overhead recovered by a unit's sponsored programs. All other items require a formula. After examining each category of income and expense, the Subcommittee chose that formula which seemed the most reasonable. Nevertheless, there are certain categories where controversy remains. As will be shown below, a number of steps have been taken to use the most reasonable formulas available.

Income is distributed in several ways. First, tuition, fees, designated endowment income, gifts, and overhead recovered from sponsored programs associated with a school rather than an individual instructional unit are isolated for each of five schools (Arts and Sciences, Business Administration, Foreign Service, Languages and Linguistics, and Graduate) and distributed to the thirty-one instructional units based on the credit hours enrolled during the academic year by students of each school. The net expenses of the International Programs office are distributed to the units on the basis of total main campus SCH enrollment. Net income for the entire SSCE is distributed to the units based on their actual summer session income since it accounts for eighty percent of the School's net income. Income for sponsored program overhead recovery is assigned to units based on their actual sponsored programs. Adjustments to income resulting from participation in the Consortium of Universities are divided between graduate and undergraduate students and distributed on the basis of SCH enrollments. All other income is distributed according to total main campus SCH enrollment.

A similar item by item approach is taken for expenses. The actual direct expenses of the instructional units, including the selected graduate fellowships noted above, are the first to be distributed. Then come the expenses of the schools, including the administrative expenses of the office of the dean, student financial aid assigned by the deans, and the expenses of the ROTC program. These expenses are distributed on the basis of SCH enrollment in the instructional units by students of the individual schools. The administrative expenses of three special graduate programs are distributed to the units enrolling students in these programs. Financial aid for Athletics, etc., is spread by total undergraduate SCH enrollment.

Library expenses proved especially difficult to assign. After considerable discussion and reflection, it was decided to include all undergraduate SCH enrollment and to double the SCH enrollment of all graduate programs except those in the natural sciences, mathematics and accounting, which are

only counted once. The rationale is that graduate students, other than those excepted, use the library at least twice as much as the undergraduate students.

The "credit to expense" allocation received from the Medical Center for Nursing School students taking courses on the main campus is distributed to the instructional units according to the SCH enrollment of those students.[4]

Central computer costs are assigned to the units on the basis of actual use. The remainder of the expenses were placed in three different groups and distributed by one of the following formulae that seemed most appropriate: either by the unit's percentage of total direct expenses, by total main campus SCH enrollment or by total undergraduate SCH enrollment. In a later version, physical plant costs will be broken down to faculty offices, laboratories, classrooms, library and other. Such a breakdown will allow a more precise allocation.

As was mentioned above, the distribution of expenses other than those directly associated with a unit causes understandable controversy. In an attempt to lessen this somewhat, future versions will provide subtotals for four broad categories of expenses: academic, academic support, broadly educational, and other. In as much as there was less controversy concerning the first two of these four categories, the Subcommittee concluded that four sets of income and expense comparisons for each unit would give a more complete and acceptable version of the main campus' allocation of resources.

The question of which formula to use to distribute income and expenses is of course at the heart of such models. As has been shown above, the Georgetown version uses a combination of actual use, donor designation, proportions of direct expenses, and various combinations of SCH enrollment. The Subcommittee examined each income and expense item and tried to use that formula that seemed most reasonable in light of the item's relationship to the activities and needs of schools and instructional units.

The choice of the formula can greatly affect the outcome. One nearby university has chosen to break expenses into two categories, direct departmental expenses and indirect expenses. The latter are simply distributed proportionately according to the former, the rationale being that higher departmental expenses reflect more faculty members and more at senior ranks, and these generate more indirect expenses than departments with lower expenses.

Recalling that Georgetown's main campus model has an adjusted budget of 21.6 million dollars and that instructional unit expenses totaled 9.4 million or forty-four percent, the following table summarizes the contribution and drain of the various instructional units using both the Subcommittee's and the above alternate formula. A glance at the table reveals that our homemade version produces a range in the balance of payments from a contribution of 618 thousand dollars to a drain of 571 thousand dollars. The alternate distribution generally expands the contributions and drains, with a range of a positive 1.2 million and a negative 1 million dollars.

TABLE I

Comparison of Contributions and Drains in Thousands of Dollars
(Differences of income and expenses using two sets of overhead distribution formulae)

Instructional Units	G.U. Model IIB*	Alternate Overhead Distribution**
1	(399)	(874)
2	(571)	(1034)
3	(8)	(12)
4	(87)	(168)
5	22	46
6	110	208
7	117	183
8	(272)	(614)
9	120	186
10	124	237
11	156	341
12	618	1233
13	196	468
14	25	30
15	12	26
16	221	299
17	(12)	(42)
18	5	27
19	(11)	0
20	(39)	(66)
21	(61)	(115)
22	24	(95)
23	(16)	37
24	(36)	(42)
25	4	11
26	2	53
27	(36)	(61)
28	(145)	(327)

Instructional Units	G.U. Model IIB*	Alternate Overhead Distribution**
29	(52)	(92)
30	(41)	(66)
31	31	122

*Model IIB is the initial version of the homemade model described in this paper.

**The alternative overhead distribution assigns indirect expenses on the basis of a unit's percentage of total direct expenses.

Program Model

At several points in the development of the departmental model, members of the Subcommittee argued that its completion would not answer a number of the critical financial questions concerning faculty staffing and resource allocation. They pointed out that the resources of the main campus were committed to a particular disciplinary configuration and balance of faculty so that the departments and schools could offer certain programs or majors to students. It was toward the completion of these programs that students and parents invested their time, energy and money. Therefore it was important to know which programs commanded which faculty resources.

The departmental model, which provided us important insights by itself, also made possible a program model by first estimating income and expenses for the academic departments. Once these figures are known, the next step is to break them down by courses offered, and then to the students enrolled according to the programs they are pursuing. A total of each program's costs can then be made from all of the instructional units (departments) contributing to the program in order to arrive at an overall cost for each program or major.

The division of a department's expenses is the first critical step. Ideally one would divide the direct expenses among the courses offered according to the actual time spent on each course by individual faculty members, together with an appropriate share of other expenses. In fact it is very difficult to achieve that ideal. Not only would a detailed and accurate faculty activity analysis be needed, but it would also be necessary to allocate non-course-related activities to individual student programs or majors. While a number of models elsewhere have attempted such an approach, the absence of a detailed faculty activity report at Georgetown will prevent its use in our program model.

What will be possible will be a modification of one approach used in "Gradcost III," a cost study recently published by The Council of Graduate Schools in the United States. The utility of this approach, CLASSCUT, was summarized in the report as follows: "Within a particular institution with allocations of classes to programs made by well-informed persons, the CLASSCUT procedure may prove to be of value in view of its simplicity."[7] It should be noted that one limitation of this approach is the difficulty of recognizing faculty activity relating to individual students in independent study, thesis and dissertation direction.

In as much as "Gradcost III" seeks only to isolate graduate costs and many courses at Georgetown cannot be neatly identified with levels, much less programs, a modification in the approach will be necessary. The Subcommittee will first have to decide which method or combination it will use to divide up the expenses of the departments. Three possible methods would be, 1) a simple division by the number of sections offered (weighted for the credit value of the course), 2) a division according to specific recommendations of the departmental chairmen, and 3) a mathematical division in which sections are weighted both for the credit value of the course and for the assumed difficulty involved in various levels or types of courses. On one hand it can be argued that graduate level courses require more preparation than undergraduate courses, while a contrary position can be taken in view of the size and the individual student grading and tutoring needed in the undergraduate courses.

Once a department's or unit's expenses have been divided among the sections offered, a method will have to be used to divide the costs of each course into the programs represented by the students enrolled. Perhaps the best way will be to use an enrollment matrix or an induced course load matrix. Both of these terms refer to the analysis of course enrollments by programs and majors. For example, an individual course in English might be composed of fifteen students, ten of them English majors, three Philosophy majors, and two Theology majors. More often than not, particularly for lower level courses, there will be students enrolled who have not yet declared a major. In order to gain multiple insights, it is proposed that the model be run two ways: first, by considering non-majors in each of the schools so as to constitute special programs or "non-major majors," second, to ask the computer to assign the non-majors in each school to the majors in proportion to the present division of majors in that school. The first would estimate the costs of the lower division instruction in programs where majors are not declared early and the second would approximate the overall costs of individual programs assuming no significant shifts over time in program distribution.

After the costs of individual courses have been divided in the above ways, the computer would be asked to total individual program costs, first for a department or unit and then for all departments that contribute to the individual program. Finally, the percentage distribution of both credits taken and costs incurred by the individual programs in the contributing departments and units would be calculated.

By distributing income of each department by courses to programs by SCH and then summing by departments and overall programs, a comparison of program income and expenses is possible.

As was mentioned earlier in this paper, the development of such a program model will require the participation of many individuals on the main campus, including Subcommittee members, deans, chairmen, technical advisers, and the members of the Main Campus Finance Committee.

Uses and Misuses

The above departmental and program models can be used and misused in several ways. Three general uses and five possible misuses are outlined below.

1) The models provide approximations of the revenues and expenses which can be reasonably attributed to each instructional unit, department and program. These approximations can be used as one of the several factors in faculty staffing and resource allocation decisions. The proper function of such models is to better inform consideration of alternative policies, priorities and plans concerning their fiscal consequences.

2) The models can increase the awareness on campus so important for an institution heavily dependent on tuition, of the link between course and program enrollment and revenues. Likewise, by the use of enrollment data which can compare revised class lists with final grade sheets, the model can increase the confidence in the data by chairmen and others concerned.

3) The models' budget of the main campus can increase an understanding of four important components: academic expenses, academic support costs, broadly educational expenses and overhead costs. A comparison of pie diagrams of these components over time will reveal possible shifts in the allocation of resources so important for the educational mission of the campus.

1) The models should not be used to establish, to dictate, or to unreasonably influence academic staffing and resource allocations on main campus. While academic planning is not and should not be the responsibility of the Subcommittee or its parent committee, the Subcommittee recognized that the development of fiscal models increases the need for a better articulation of both the goals and priorities of the main campus and the process used in academic planning. The absence of such an articulation, particularly in the presence of financial models, increases the impression that faculty staffing and resource allocation decisions are made without adequate academic consideration and judgement.

2) The focus of the models on instructional units and departments should not reduce the scrutiny needed to improve service, efficiency and economy in other offices and departments on campus. These non-instructional departments are justified only by their contributions to the support of the academic and educational mission of the campus.

3) The exactness of numbers, totals and differences of income and expenditures should not be allowed to obscure the general estimate nature of the numbers. Even if one accepts the reasonableness of the formulae used, at least ten to fifteen percent allowance for adjustments seems reasonable. It is the relative or proportional relationships of these numbers that are important.

4) The models do not furnish any information about the quality of the teaching, research or service of individual departments or programs. While the program models will provide some insights concerning the distribution of resources within a department, it does not even approximate the division or effectiveness of the various activities of faculty members or departments among instruction, research, service, departmental or campus administration, program and course development, publications, and contemplative and creative activities. At this point it would be useful to recall a statement by Paul Dressel concerning the present state of resource allocation models.

> The search for less costly methods for meeting institutional responsibilities while retaining acceptable levels of quality is evidenced in the numerous articles and books about budgeting, planning and management that have appeared in the last five years. But have efficient and effective methods of resource allocation compatible with institutional organization, goals and needs been put into effect? We believe that with rare exceptions, the answer is negative. This is largely because practicable resource allocation models still need to be developed, ones that are predicated on the basic organizational unit of universities, the department, and built on a planning frame that facilitates redistribution of resources on the basis of the goals of the institution and the roles of the departments in fulfilling these goals.[8]

The above models, as beginning steps at Georgetown University, are valuable for the insights they provide, but they do not pretend to achieve the goal set for such models by Paul Dressel.

5) Finally, the Georgetown models should not be used to try and predict future circumstances by any use of average costs. To quote a recent landmark study, ". . . average historical full costs per unit of service, representing the cost of past activities, is not a valid tool for projecting the cost of alternative courses of action. Historical or past cost only serves as a reference for making projections. Administrators wishing to project economic results must consider changes in conditions existing within the institution as well as changes in the environment which may affect the future use of institutional resources."[9]

Other Factors in Resource Allocations

Reference has been made above to the non-cost factors involved in faculty staffing and allocation decisions. A summary of these and their implications for financial models might best be made from the American Council on Education study noted above.[10]

- Cost is not a dominant consideration in most allocation decisions. Program completeness, program quality, institutional priorities, and interpersonal relations frequently are more important than cost.
- Load is a major consideration in many allocation decisions.
- Managerial style is an important determinant of the role of cost analysis in allocation decisions.
- Cost related data (class size, faculty workload, student/faculty ratios, and faculty salary rate) are preferred to unit cost data in supporting allocation decisions.
- Before generating cost data, it is important to understand the current and expected role of cost information in specific decision processes. An understanding of the relative role of cost data in the decision making process may influence the analysis.
- Careful consideration of cost related data is important. It has the advantage of indicating problems and identifying the status of important decision variables at the same time.

Conclusion

Hopefully the above descriptions of two homemade financial models and the accompanying commentary will be of assistance in understanding their possible roles in faculty staffing and resource allocation. For other members of the Subcommittee, the paper is meant to outline some of the considerations and decisions the Subcommittee will face in the coming year. For others outside the University, the paper might be of some assistance in thinking about model building and utilization in other institutions. From all, comments and suggestions would be appreciated since the author is interested in using this opportunity to continue his own education.

FOOTNOTES

[1]Joseph Pettit is the Dean of the School for Summer and Continuing Education and the Convenor of the Subcommittee on Faculty Staffing and Resource Allocation at Georgetown University in Washington, D.C., 20057.

[2]Campus Resources for Higher Education: A Taxonomy of Types and Geographic Distribution, Academy for Educational Development, Washington, D.C., 1973, p.22.

[3]Taken from a confirmation sheet received from the AAUP, May 16, 1978 to be published in the Summer 1978 issue of the AAUP Bulletin, Washington, D.C.

[4]In addition, 572 Nursing School students enroll in arts, humanities and science courses on the main campus.

[5]Profile of American Colleges: An Indepth Study of Georgetown University, Barron's Educational Series, Inc., Woodberry, N.Y., 1978, p.2.

[6]Adams, Carl R., R.L. Hankins, Gordon W. Kingston and Roger G. Schroeder, The Production and Use of Cost Analysis in Institutions of Higher Education, Monograph 2 of A Study of Cost Analysis in Higher Education, American Council on Education, 1978, pp. 123, 124 and 128.

[7]McCarthy, Joseph L. and William D. Garrison, The Costs and Benefits of Graduate Education: Estimation of Graduate Degree Program Costs, The Council of Graduate Schools in the United States, June 1978, p. 17.

[8]Dressel, Paul and Lou Anna Kimsey Simon, Allocating Resources Among Departments, San Francisco: Jossey-Bass, Inc., 1976, p.1.

[9]Robinson, Daniel D., Howard W. Ray and Frederick Turk, "Cost Behavior Analysis for Planning in Higher Education," NACUBO Professional File, Vol. 9, No. 5, May 1977, p.3.

[10]Adams et al, A Study of Cost Analysis in Higher Education, Vol. 2, pp. 126 and 127.